

A B S T R A C T

This paper examines structured opportunities for student physical activity in Ontario elementary and secondary schools. Random samples of elementary and secondary schools were selected, and telephone surveys of 353 elementary and 360 secondary school personnel were conducted in 1998. The findings indicate that elementary schools offered physical education, on average, just under three days per week. The duration of physical education class and, in some cases, the duration of vigorous physical activity in class and the weekly amount of vigorous activity in class, were significantly higher at successive grade levels. The physical education enrollment rate in secondary schools was significantly lower at successive grade levels. Student participation in secondary school intramurals and inter-school sports was 22.8% and 28.7% respectively. These findings suggest increasing the weekly frequency of physical education in elementary schools and increasing participation in physical education classes in secondary schools. Also, intramural opportunities and participation should be promoted.

A B R É G É

Ce document étudie la pratique de l'activité physique encadrée chez les écoliers du primaire et du secondaire en Ontario. On a sélectionné des échantillons aléatoires puis mené des sondages par téléphone auprès de 353 membres du personnel d'écoles primaires et de 360 membres du personnel d'écoles secondaires, en 1998. Les conclusions montrent que les écoles élémentaires offrent des cours d'éducation physique un peu moins de trois jours par semaine en moyenne. On observe que la durée du cours (dans certains cas, l'activité physique y est pratiquée de façon intense), et le nombre de cours d'éducation physique par semaine, augmentent de manière importante en proportion des niveaux successifs. On constate, par contre, que l'inscription aux cours d'éducation physique dans les écoles secondaires baisse de manière significative avec les niveaux successifs. La participation des étudiants du niveau secondaire dans les sports internes et interscolaires était de 22,8 % et de 28,7 % respectivement. Ces conclusions indiquent une augmentation de la fréquence hebdomadaire aux cours d'éducation physique dans les écoles primaires et une augmentation de la participation aux cours d'éducation physique dans les écoles secondaires. Par conséquent, on devrait promouvoir les possibilités internes d'activité physique et la participation à l'activité physique.

Structured Opportunities for Student Physical Activity in Ontario Elementary and Secondary Schools

Kenneth R. Allison, PhD,¹ Edward M. Adlaf, PhD^{1,2}

Increasing evidence supports the positive role of regular physical activity both in preventing disease and promoting health and well-being.¹ Physical activity and fitness are associated with lower adult mortality rates for several conditions,¹⁻⁵ as well as enhanced physical and mental health.⁶ Physical activity during childhood and adolescence also has health benefits⁷ and may have important implications for activity levels in adult life.^{8,9} The problem is that participation in regular physical activity declines with age, and among females, within the teenage years.¹⁰⁻¹² Participation is at least partly influenced by opportunities to engage in regular physical activity.^{13,14} Thus, policies and curricula concerning the type and amount of activity offered in physical education class and other school-related settings (intramurals, inter-school sports) represent structured opportunities for students.

A number of federal and provincial organizations in Canada have promoted the notion of "quality daily physical education" (QDPE), or daily physical activity, for elementary and secondary level students,¹⁵⁻¹⁷ and this program's effectiveness was assessed recently.¹⁸

The study reported here did not assess QDPE specifically, but examined the avail-

ability and utilization of physical education and other types of physical activity in Ontario elementary and secondary schools. An examination of opportunities contributes to a better understanding of the role of schools in helping children and youth attain sufficient levels of physical activity. Findings from this study can be used to provide baseline data and to help set objectives for school-based physical activity.

METHODS

Sample

The data are based on two systematic random samples generated by the Institute for Social Research (ISR), York University, using information from the Ontario Ministry of Education's Directory and MIDENT file. The target population represents 3,900 elementary schools and 800 secondary schools of the regular public and Catholic school systems. It was determined that a sample of 350 schools per school type would provide sufficient precision for both cross-sectional and baseline estimates. The sample resulted in completions of 353 elementary and 360 secondary schools, representing response rates of 73.2% and 74.5%, respectively.

Description of respondents and schools

Respondents at the elementary school level consisted primarily of principals or vice-principals (58.3%), physical education teachers (17.8%), or others (23.9%, i.e., classroom teachers, resource teachers, and others). Approximately half (49.9%) of the schools participating in the survey represented a range of grades from JK to grade 8, while 12.7% of schools included JK to grade 6, and the remaining schools includ-

1. Department of Public Health Sciences, Faculty of Medicine, University of Toronto

2. Centre for Addiction and Mental Health, Toronto, ON

Correspondence and reprint requests: Dr. Kenneth R. Allison, Associate Professor, Department of Public Health Sciences, Faculty of Medicine, University of Toronto, 12 Queen's Park Crescent West, Toronto, ON, M5S 1A8, Tel: 416-978-5869, Fax: 416-978-2087, E-mail: k.allison@utoronto.ca.

This research was supported by a grant from the Ontario Ministry of Health. Dr. Kenneth R. Allison is supported by an Ontario Ministry of Health Career Scientist award.

ed other grade ranges. The mean number of students enrolled in the elementary schools was 365.3. Grades 1, 3, 6, and 8 were selected for the study since provincial guidelines provided in the Common Curriculum describe learning outcomes for physical education for some of these grades (3 and 6).

Unlike the elementary school survey, secondary school respondents consisted primarily of physical education teachers (72.5%). Additional respondents consisted of principals or vice-principals (11.1%), and others (16.4%). Most of the schools represented in the survey (86.1%) contained a range of grades beginning with grade 9 and ending with OAC (previously known as grade 13). The mean number of students enrolled in secondary schools included in the study was 880.9.

With one exception, there were no differences in outcomes based on the type of respondent at either the elementary or secondary school level.

Data collection

The study was approved by the university ethics committee. The questionnaires, which included items dealing with opportunities and participation in physical education, intramurals, and inter-school sports (Table I), were developed with input from an advisory committee. A computer-assisted telephone interviewing (CATI) version of the questionnaire was produced and pre-tested by ISR. The data collection period was June 1998 for the elementary schools and June-October, 1998 for the secondary schools. Telephone interviews were conducted with a representative from each school using trained ISR interviewers. The interviewers asked to speak with an individual knowledgeable about the school's physical education program. Completed interviews averaged nine minutes in both elementary and secondary schools.

Data analysis

The findings reported here include both descriptive and bivariate analysis. Pearson correlations were used to examine the linear relationship between continuous variables. Cross-tabulations of categorical variables utilized the chi-square test. Analysis of variance was used to

TABLE I Measures Used	
Elementary Schools Only	
Frequency	- the average number of days per week that students have physical education class in grades 1, 3, 6, and 8. (range 1-5)
Duration of physical education class	- the number of minutes in the typical physical education class in grades 1, 3, 6, and 8. (range 10-61)
Duration of vigorous physical activity	- in a physical education class, the number of minutes of vigorous physical activity the typical student receives in grades 1, 3, 6, and 8. (A physical activity is vigorous if it makes a student's heart beat faster and makes them breathe a lot faster than normal). (range 0-80)
Weekly minutes of vigorous physical activity	- a derived variable created by multiplying frequency times duration of vigorous physical activity for grades 1, 3, 6, and 8. (range 0-300)
Participation rate in intramural program	- the percentage of students participating in an intramural program of organized physical activity between January, 1998 and the end of the school term.
Participation rate in inter-school sports	- the percentage of students participating in an inter-school sports program between January, 1998 and the end of the school term.
Responsibility for teaching physical education	- who teaches most of the physical education classes in the school: a classroom teacher, a physical education specialist, a combination of classroom teachers and physical education specialist, a parent or volunteer, or some other arrangement.
Secondary Schools Only	
Offering physical education	- whether the school offers curriculum-based physical education in classes in grades 9, 10, 11, 12, and OAC. (yes/no)
Enrollment in physical education courses (PEER)	- a derived variable based on enrollment in physical education courses as a proportion of the total number of students enrolled in a particular grade in schools offering physical education classes.
Participation rate in intramural program	- a derived variable indicating the proportion of students participating in an intramural program during the spring (1998) term, based on the number of students participating divided by the number of students enrolled in schools offering an intramural program.
Participation rate in inter-school sports	- a derived variable indicating the proportion of students participating in inter-school sports programs during the spring (1998) term, based on the number of students participating divided by the number of students enrolled in schools offering an inter-school sports program.
Both Elementary and Secondary Schools	
Offering intramural program	- having an intramural program of organized physical activity in the school. (yes/no)
Offering inter-school sports program	- having an inter-school sports program. (yes/no)
School board policy	- whether school boards have written guidelines to ensure safe participation in curriculum-based physical education classes. Similar questions dealt with intramural physical activity programs and inter-school sports. (yes/no)
Use of community recreation resources	- school use of community recreation resources or programs that are available to students. (yes/no)
Region	- based on telephone area exchange numbers of schools included in the survey. (area codes 416, 519, 613, 705, 807, and 905)
Respondent's position	- principal, vice-principal, physical education specialist/physical education teacher, other.

examine differences in continuous outcomes by categorical level variables. In order to examine the significance of grade level differences in outcomes, sample t-tests with unequal variance were used. Nine key indicators (outcome variables) in the analysis included: frequency of physical education class, duration, minutes of vigorous activity in class, and weekly amount of vigorous activity (elementary level); physical education enrollment rate (secondary level); and intramural offering and participation, inter-school sports offering and participation (both levels).

RESULTS

Elementary schools

Physical Education Classes

All respondents in the survey (100%) reported that students participate in physical education classes as part of the curriculum at their school. There was little variability by grade level in the average number of days per week (just under 3) that students engaged in physical education classes (not shown in tables). However, there was more variability by grade in the average number of minutes included in a

TABLE II
Grade Differences in Duration of Physical Education Class, Duration of Vigorous Physical Activity, and Weekly Minutes of Vigorous Physical Activity

Grade	Duration of Physical Education Class (mins.)				Duration of Vigorous Physical Activity (mins.)				Weekly Minutes of Vigorous Physical Activity (mins.)			
	N	M	P*	SD	N	M	P*	SD	N	M	P*	SD
One	311	35.9	-	6.7	238	14.2	-	7.4	205	42.6	-	30.9
Three	309	37.5	0.002	6.2	238	16.4	0.002	7.9	204	46.7	NS	28.5
Six	292	39.7	0.001	7.1	230	19.7	0.001	10.1	193	55.9	0.005	35.3
Eight	235	42.3	0.001	7.7	178	21.5	NS	10.2	145	57.9	NS	33.2

* Based on two sample t-tests, comparing subsequent grade levels (e.g., grade three compared to grade one).

TABLE III
Intramural and Inter-school Sports Participation
Elementary Schools

	N	Percent	Mean Percent
Schools with intramurals	353	88.4	
Schools with inter-school sports	352	92.0	
Students participating - intramurals	301		57.8
Students participating - inter-school sports	314		31.4

N = the number of schools responding.

TABLE IV
Grade Differences in Physical Education Enrollment Rate (PEER)*
Secondary Schools

Grade	N	PEER (M)	P†	SD
Nine	337	0.95	-	0.16
Ten	288	0.63	0.001	0.21
Eleven	275	0.54	0.001	0.35
Twelve	258	0.45	0.001	0.23
OAC	52	0.33	0.002	0.25

* PEER represents enrollment in physical education courses as a proportion of the total number of students enrolled in a particular grade in schools offering physical education classes.

† based on t-tests comparing subsequent grade levels (e.g., grade ten compared to grade nine).

TABLE V
Intramural and Inter-school Sports Participation
Secondary Schools

	N	Percent	Participation Rate (M %)
Schools with intramurals	355	67.0	
Schools with inter-school sports	355	86.2	
Students participating - intramurals	217		22.8
Students participating - inter-school sports	292		28.7

N = the number of respondents at the school level reporting the information.

typical physical education class. The length of class time devoted to physical education was significantly greater (by approximately two minutes) for each of the years included (Table II).

The findings also indicate a significantly greater average number of minutes of vigorous physical activity in physical education class at grade 3 compared to grade 1, and at grade 6 compared to grade 3 (Table

II). Furthermore, the average weekly amount of vigorous physical activity was significantly higher at grade 6 compared to grade 3 (Table II). Within grade levels, the weekly amount of vigorous physical activity was negatively correlated with school size (ranging from $r=-0.188$ to $r=-0.233$). That is, the weekly amount of vigorous physical activity was lower in larger schools at each grade level surveyed. However, the

amount of weekly vigorous physical activity was unrelated to type of respondent, region, or primary responsibility for teaching physical education classes (not shown in tables).

Intramural and Inter-school Sports Programs

The majority of elementary schools (88.4%) reported offering an intramural program (Table III). Having an intramural program was related to school size ($F=6.57$, $p<0.01$), with schools offering programs more likely to have higher enrollment. However, offering an intramural program was unrelated to region, respondent's position, responsibility for teaching physical education, and whether or not schools make use of community recreation resources. During the period January-June, 1998, 57.8% of elementary school students participated in these intramural programs. The intramural participation rate was inversely related to school size ($r=-0.293$, $p<0.001$), and was related to type of respondent ($F=3.17$, $p<0.05$), although multiple comparison tests showed no significant differences between specific pairs of respondent (principals vs. teachers). The intramural participation rate was unrelated to region, responsibility for teaching physical education, and use of community recreation resources (not shown in tables).

Almost all (92.0%) elementary schools reported offering an inter-school sports program (Table III), and offering a sports program did not differ significantly by school size, region, responsibility for teaching physical education, type of respondent, or use of community recreation resources. About one third (31.4%) of students participated in these inter-school sports programs between January-June, 1998. School size was inversely related to participation ($r=-0.161$, $p<0.01$), but region, responsi-

bility for teaching physical education, type of respondent, and use of community recreation resources were unrelated to sports participation (not shown in tables).

Secondary schools

Curriculum-based Physical Education

With the exception of OAC, there was little variability between grades regarding the offering of curriculum-based physical education classes. Most schools (about 98%) included curriculum-based physical education classes offered for grades 9-12. However, only 21.1% of the schools reported offering curriculum-based physical education classes at the OAC level (not shown in tables).

Physical Education Enrollment Rate

Table IV indicates that the physical education (course) enrollment rate (PEER) was significantly lower by grade level, with the highest physical education class enrollment rate in grade 9 (0.95), and the lowest rate at the OAC level (0.33). PEER was inversely correlated with school size in the case of grades 9 ($r=-0.109$, $p<0.05$) and 10 ($r=-0.20$, $p<0.001$), but was not correlated with school size for grades 11, 12, and OAC. PEER did not differ significantly by region or type of respondent (not shown in tables).

Intramural and Inter-school Sports Programs

Sixty-seven percent of schools reported offering an intramural program at the secondary level (Table V). Whether or not schools offered an intramural program was unrelated to school size, geographic region, respondent's position, and whether schools make use of community recreation resources. Within schools offering an intramural program, an intramural participation rate of 22.8% was calculated, based on the number of students participating in the spring term (January-June, 1998) divided by the number of students enrolled in schools offering an intramural program. The intramural participation rate was negatively correlated ($r=-0.34$, $p<0.001$) with school size. Thus, larger schools were more likely to have lower rates of intramural participation than smaller schools. The intramural participation rate was unrelated to

geographic region, type of respondent, and whether or not schools make use of community recreation resources (not shown in tables).

Most schools (86.2%) reported having an inter-school sports program (Table V). Whether or not schools offered an inter-school sports program was related to geographic region (Chi-square=23.52, $p<0.001$). Whether or not schools offered inter-school sports was unrelated to school size, type of respondent, and whether or not schools used community recreation resources (not shown in tables).

For schools offering inter-school sports, a participation rate of 28.7% was calculated (Table V). The inter-school sports participation rate was related to geographic region, with multiple comparison tests showing a significantly higher rate in one of the northern Ontario regions (area code 705) compared to Metropolitan Toronto (area code 416). The inter-school sports participation rate was negatively related to school size ($r=-0.23$, $p<0.001$). However, the inter-school sports participation rate was unrelated to type of respondent, and whether or not schools used community recreation resources (not shown in tables).

DISCUSSION

The findings raise interesting questions concerning whether opportunities provided for structured school-based physical activity are sufficient in terms of such characteristics as activity type, frequency, duration, and intensity. Several organizations recommend offering physical education on a daily basis.^{15-17,19,20} Moreover, an international consensus statement on physical activity guidelines recommends that, in addition to daily (total) physical activity, "adolescents should engage in three or more sessions per week of activities that last 20 minutes or more at a time and that require moderate to vigorous levels of exertion."²¹ If the standard of comparison is the notion of quality daily physical education, it would appear that Ontario elementary schools are at a lower than optimal level. Although school-based curricula for physical education are available on a uniform basis for all grades surveyed, physical education in elementary and middle

schools is offered just under three days per week.

The findings indicate that the reported duration of typical physical education classes and, in some cases, the duration of vigorous physical activity in class and the weekly amount of vigorous physical activity were significantly higher by grade level up to grade 6. However, even the upper level elementary and middle school students are offered amounts of vigorous physical activity in physical education classes only approaching, or marginally within, the suggested guidelines for children and adolescents.²¹ From another perspective, one of the Healthy People 2000 (U.S.) objectives is "to increase to at least 50% the proportion of school physical education time that students spend being physically active..."²² In the current study (using information from Table II), the proportion ranged from 39.5% (grade 1) to 50.8% (grade 8).

At the secondary school level, curriculum-based physical education classes appear to be available to students at most grade levels (other than OAC). However, there were significantly lower physical education course enrollment rates at subsequent grades examined. This phenomenon is partly explained by provincial requirements for a single physical education credit, normally taken in grade nine. However, the findings suggest declining enrollment at each grade level surveyed, supported by additional studies on age differences in physical activity participation in Canada and elsewhere.⁷⁻⁹

The problem of declining physical education course enrollment by grade is compounded by low levels of participation (22.8%) in school-based intramural programs at the secondary school level. The reasons for low levels of participation in intramural programs were not determined in this study. Additional information concerning the range of intramural activities is needed, along with data dealing with barriers to participating in intramurals. Such issues as the time and facilities available, and students' interest in participating, need to be explored more fully.

Limitations of the study included the use of different types of respondents, the use of measures of unconfirmed validity

and reliability, and the sole reliance on data provided by respondents. We found only one instance of a significant difference in outcome by type of respondent. Regarding validity and reliability of the measures, while we did not undertake to examine these in detail, a pre-test conducted by ISR indicated that the measures had face validity and could be used reliably by trained interviewers. Although the accuracy of data obtained was not confirmed through observation or other means, we attempted to obtain the best reported information possible in a telephone-administered short survey of school personnel.

While the current study examined some important quantitative indicators of structured opportunities for physical activity in elementary and secondary schools, further questions remain. Additional information on patterns and predictors of student participation in vigorous physical activity is needed. In addition, information is needed on more qualitative aspects of structured physical activity opportunities.

Based on the current study, implications for the field include the need to establish objectives for school-based physical activity in the various settings – physical education class, intramurals, and inter-school sports. In particular, the adequacy of an average of three physical education classes per week in elementary schools needs to be addressed. Also, the problem of declining enrollment in secondary school physical education courses requires attention, both in terms of the factors influencing this pattern, and ways of increasing enrollment. Finally, school-based intramural activity, particularly at the secondary school level, needs to

be further developed through policy support, increased opportunities for a variety of activities, and the promotion of these programs to students.

ACKNOWLEDGEMENTS

The following individuals provided useful advice to the study: Charles Clayton, Jennifer Cowie Bonne, Michelle Brownrigg, David Carmichael, Erica de Ruggiero, Terry McKinty, David Northrup, and two anonymous reviewers.

REFERENCES

1. Pate R, Pratt M, Blair S, et al. Physical activity and public health: A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *JAMA* 1995;273:402-7.
2. Blair S, Kohl H, Paffenbarger R, et al. Physical fitness and all-cause mortality: A prospective study of healthy men and women. *JAMA* 1989;262:2395-401.
3. Powell K, Thompson P, Caspersen C, Kendrick J. Physical activity and the incidence of coronary heart disease. *Annu Rev Public Health* 1991;8:253-87.
4. Powell K, Blair S. The public health burdens of sedentary living habits: Theoretical but realistic estimates. *Med Sci Sports Exerc* 1996;26:851-56.
5. U.S. Department of Health and Human Services. Physical Activity and Health: A Report of the Surgeon General. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, 1996.
6. Stephens T. Physical activity and mental health in the United States and Canada: Evidence from four population surveys. *Prev Med* 1988;17:35-47.
7. Guidelines for school and community programs to promote lifelong physical activity among young people. National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention. *J Sch Health* 1997;67:202-19.
8. Dishman R, Dunn A. Exercise adherence in children and youth: Implications for adulthood. In: Dishman R, Dunn A (Eds.), *Exercise Adherence: Its Impact on Public Health*. Champaign: Human Kinetics, 1988.
9. Malina R. Tracking of physical activity and physical fitness across the lifespan. *Res Q Exerc Sport* 1996;57:48-57.
10. Sallis J. Epidemiology of physical activity and fitness in children and adolescents. *Crit Rev Food Sci Nutr* 1993;33:403-8.
11. Heath G, Pratt M, Warren C, Kann L. Physical activity patterns in American high school students. *Arch Pediatr Adolesc Med* 1994;148:1131-36.
12. Allison K, Adlaf E. Age and sex differences in physical inactivity among Ontario teenagers. *Can J Public Health* 1997;88:177-80.
13. King A, Jeffery R, Fridinger F, et al. Environmental and policy approaches to cardiovascular disease prevention through physical activity: Issues and opportunities. *Health Educ Q* 1995;22:499-511.
14. McKenzie T. School health-related physical activity programs: What do the data say? *JOPERD* 1999;70:16-19.
15. The Canadian Association for Health, Physical Education and Recreation. The QDPE Leader's Lobbying Kit. Ottawa: Government of Canada Fitness and Amateur Sport, 1993.
16. The Ontario Physical and Health Education Association. Towards QDPE: Final Summary Report on 1995 Needs Assessment Survey. Toronto: Ontario Physical and Health Education Association, 1995.
17. Canadian Fitness and Lifestyle Research Institute. Physical Inactivity in Ontario: A Framework for Action. Ottawa: Canadian Fitness and Lifestyle Research Institute, 1996.
18. Chad K, Humbert M, Jackson P. The effectiveness of the Canadian Quality Daily Physical Education program on school physical education. *Res Q Exerc Sport* 1999;70:55-64.
19. Ontario Ministry of Health. *Promoting Heart Health*. Toronto: Queen's Printer for Ontario, 1993.
20. Report of the Royal Commission on Learning. Toronto: Queen's Printer for Ontario, 1995.
21. Sallis J, Patrick K. Physical activity guidelines for adolescents: Consensus statement. *Ped Exerc Sc* 1994;6:302-14.
22. Healthy people 2000: National health promotion and disease prevention objectives and healthy schools (adapted from Healthy People 2000: National Health Promotion and Disease Prevention Objectives (DHHS Pub. No. (PHS) 91-50212). *J Sch Health* 1991;61(7):298-328.

Received: August 3, 1999

Accepted: March 6, 2000